Attachment 2

Lignite Energy Council Comments on the Draft FLAG 2008 Guidance

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Background

This report, provided on behalf of the Lignite Energy Council (LEC), provides several comments on a proposed revision to guidance (FLAG, 2000) initially issued in late 2000 by the Federal Land Managers (FLMs) regarding assessment of newly proposed air emission sources on Air Quality Related Values (AQRVs) in Prevention of Significant Deterioration (PSD) Class I areas. The FLMs consist of the National Park Service, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture Forest Service. The FLMs' AQRV Work Group (FLAG) was formed (1) to develop a more consistent and objective approach to (1) evaluate air pollution effects on AQRVs, and (2) to provide State permitting authorities and potential permit applicants consistency on how to assess the impacts of new and existing sources on AQRVs. The FLAG effort focuses on the effects of the air pollutants such as ozone, particulate matter, nitrogen dioxide, sulfur dioxide, nitrates, and sulfates.

The original Phase 1 FLAG guidance document issued in 2000 had the objective of satisfying the goals listed above. However, the guidance was issued without the benefit of time-tested application experience, and several concerns about certain aspects of the 2000 guidance have been noted by reviewing agencies as well as permit applicants subject to the 2000 FLAG guidance. See, for example, Paine et al. (2004) and Pearson et al. (2003).

Our concerns about FLAG 2000 include the following issues:

- Regional haze predictions were designed to be heavily dependent upon the effect of relative humidity for the increased scattering efficiency of sulfate and nitrate particles. This relative humidity dependence resulted in counterintuitive worst-case prediction results, such as during periods of natural meteorological obscuration or during cloudy nighttime periods with no possibility for any meaningful visual perception.
- The perceptibility threshold of a 10% change in extinction (about 1 deciview) is generally not observed in actual practice. A more realistic threshold value is on the order of a 20% change for the most optimal color conditions and distances, as noted by Henry (2002). This is also consistent with comments by Malm (2005), which indicate that perception of haze that is uniformly mixed throughout the atmosphere is more difficult (and associated with a higher deciview value) than layered haze, which is generally associated with short-range plume blight for which a perception threshold of 1 deciview may be more appropriate rather than 2 deciviews for uniform haze. Therefore, regional haze associated with long-range transport, the FLAG threshold for an adverse impact from a proposed source is too stringent by at least a factor of 2.

- These low thresholds that denote a significant project impact are in effect applied to the highest modeled daily prediction, such that outlier days that exceed this very low threshold are determined to cause an adverse visibility impact.
- The natural background extinction levels used by FLAG 2000 omit certain components, such as smoke from wildfires, which have been unnaturally suppressed by human activity over the past several decades, and naturally occurring sea salt. In fact, many Class I areas have their worst-case observed haze events during wildfires and natural windblown dust events, and these events are not adequately represented in the characterization of natural background. Therefore, FLAG 2000 portrays "natural conditions" as being much more pristine than they actually are.
- Acidic deposition analysis thresholds (DATs) used for screening assume an overly conservative factor, such that 25 projects of a similar impact would need to affect the area in order to have a detectable effect. Therefore, the DAT levels are overly restrictive.
- The beneficial effects of retirement of millions of tons of SO_2 and NOx emissions are not adequately accounted for in the consideration of impacts of new sources on AQRVs (as well as PSD increment consumption). In general, taking credit for retirement of past emissions is not encouraged in FLAG analyses.
- Methods used to evaluate short-range visual plume impacts are overly conservative, and the threshold for concern actually changes (gets more stringent) for refined procedures, which is a disincentive for applying these refined procedures.
- Revised f(RH) curves have been published by EPA for use in tracking progress under the Regional Haze Rule and incorporated into the new IMPROVE equation implementation. The FLAG 2000 guidance does not incorporate these updated curves.

Many of these concerns have been discussed at technical conferences or in permit application documents over the past several years. In addition, new United States Environmental Protection Agency (USEPA) regulatory programs such as the Best Availability Retrofit Technology (BART) program as part of the Regional Haze Rule (RHR) implementation have provided new procedures and metrics for assessing perceptible visibility impacts and for screening out sources with low emissions and large Class I Area distances.

Based upon the considerable experience gained over the past several years and with the implementation of the BART guidance by EPA, the FLMs have determined that revisions to the FLAG 2000 guidance is appropriate. Their proposed new guidance (FLAG 2008) was released on July 8, 2008. The most significant changes proposed in the draft FLAG 2008 revision are summarized as follows.

- Similar to the BART guidelines, FLAG 2008 screens out from AQRV review proposed sources with relatively low emissions at large distances from Class I areas (i.e., $Q/D \leq 10$, where Q is the short-term emission rate of SO_2 + NOx + PM_{10} expressed in tons per year, and D is the distance from the Class I area in kilometers).
- Updated EPA (2003) estimates of natural conditions are used.
- A new IMPROVE algorithm for relating particulate concentrations to visibility impairment (extinction) that incorporates site-specific parameters, such as salt particles and Rayleigh scattering, is incorporated into the visibility assessment.

FLAG 2008 adopts criteria derived from the 2005 BART guidelines that utilize monthly average relative humidity adjustment factors to minimize the effects of weather events (i.e., short-term meteorological phenomena) and high nighttime relative humidity on modeled visibility impacts. This approach is referred to as the CALPOST Method 6 approach (the FLAG 2000 method is referred to as the CALPOST Method 2 approach). Although the FLMs are proposing to adopt the CALPOST Method 6 approach consistent with BART, they are soliciting comments on whether they should make this change from the Method 2 approach.

- FLAG 2008 also adopts criteria from the 2005 BART guidelines that set a 98th percentile value to screen out the top 2% (seven days) of outlier conditions. It is noteworthy that the BART threshold for contributing to a perceptible visibility change is still too low at 0.5 delta-deciviews (about a 5% change in extinction for typical background extinction values).
- The revised FLAG guidance has deposition analysis thresholds (DATs) and concern thresholds for nitrogen and sulfur deposition impacts on vegetation, soils, and water. These thresholds were suggested for general use after the FLAG 2000 guidelines were published.

How the Proposed Changes in FLAG 2008 Address Some of the Stated Concerns

In technical terms, the FLAG 2000 guidance has been perceived to overstate visibility impacts from proposed emission sources due to shortcomings described above. The adoption of the monthly average relative humidity and the use of the 8^{th} highest day's prediction, consistent with the BART rule, addresses, to some extent, two of the concerns, as discussed below.

- High relative humidity periods are often associated with precipitation events (which should be excluded from visibility degradation calculations because of natural obscuration to visibility). The use of monthly average relative humidity values tends to avoid predictions during these weather events that should be excluded from analysis.
- As noted above, the visibility impact thresholds for concern with FLAG 2000 are well below levels of perceptibility. Although FLAG 2008 does not change these low thresholds, it does account for 7 outlier days above these levels, which to some extent mitigates this conservatism.
- A number of advances associated with the implementation of the new IMPROVE equation are incorporated into FLAG 2008. These advances involve the recognition of sea salt as a natural particle associated with light scattering, site-specific Rayleigh scattering extinction values, and updated f(RH) curves.

Accordingly, the Lignite Energy Council supports the adoption of these BART-adopted modifications for regional haze assessments into FLAG 2008.

The FLAG 2008 document refers to both annual average and 20% best days' background as a possible alternative. To reduce confusion and the need for duplicative analyses and reporting of results for this FLAG guidance, especially for applications involving Class I areas in multiple states, LEC recommends that only the annual average background should be used for all Class I areas.

Proposed Q/D Screening Approach

FLAG 2008 proposes a screening approach in which AQRV modeling analyses are not required if the sum of the short-term emissions of SO_2 + NO_x + PM_{10} + H_2SO_4, expressed in tons per year, are less than the distance (D, in km) to a PSD Class I area of interest. FLAG 2008 also indicates that notification requirements should include all Class I areas for which Q/D exceeds 10. LEC notes that since H_2SO_4 is included in total PM_{10} estimates, the total emissions in Q should not double count the H_2SO_4.

We understand that the proposed screening approach will for the most part conservatively remove from consideration Class I areas for which a refined analysis would have indicated an insignificant impact. This will save considerable analysis effort in the modeling, but only if this exemption from modeling also extends to estimates of PSD increment consumption. To determine whether the proposed Q/D =10 screening threshold would be effective for screening out unnecessary increment analyses, ENSR reviewed several completed and accepted PSD Class I CALPUFF modeling analyses. This information is provided in Appendix A. Basically, our findings result in the following recommendations.

- A Q/D threshold of 10 is a conservative indicator of a proposed project's likelihood of showing significant impacts for increment consumption, perceptible visibility change, and acidic deposition.

- The screening procedure should be extended to the requirement to model PSD increment consumption. In fact, we find that the inclusion in the estimate of Q of just the emissions associated with the individual pollutant at issue for increment consumption still shows that a Q/D = 10 threshold is a conservative indicator of whether a project would have a significant impact for increment consumption in PSD Class I areas.

- For acidic deposition, the use of only SO_2 emissions for Q involving sulfur deposition and only NO_x emissions for nitrogen deposition is recommended.

LEC recommends that the Q/D screening approach should have no distance limitations; it should apply for all values of D (even less than 50 km). Although FLAG 2008 does not specifically address PSD increment consumption, it should note that the Q/D < 10 screening process can be extended to increment consumption so that the considerable effort of having to conduct CALPUFF modeling for some elements of a permitting application but not others is avoided.

Notification Requirements and Class I-Specific Data

With the recognition from IWAQM Phase 2 (1998) and 40 CFR Part 51 Appendix W that the distance limitation for CALPUFF unbiased estimates is about 300 km, LEC recommends that FLAG 2008 should stipulate that no Class I areas outside of 300 km should be considered for modeling. In addition, FLM notification requirements for a proposed project should be limited to only those Class I areas that are located within 300 km of the project. In addition, we recommend that appropriate contacts for notification for each Class I area should be maintained on a web site by the FLMs. At the current time, it is difficult to determine who to contact for some of the Class I areas. The FLMs should maintain a web site that provides the following information for each Class I area:

- who to notify/contact, and the contact information;

- the modeled receptors and the PSD minor source baseline date;

- the types of analyses required if there are site-specific issues that depart from the standard FLAG procedures;

- acid neutralizing capacity (ANC) analysis data for various bodies of water, including the baseline ANC, the watershed area, and the annual precipitation amount;

- emission source inventories to be used for cumulative analyses, and the associated minor source baseline date;

- data files for modeling such as hourly ozone values; and

- background ammonia data and other model input specifications that are site-specific.

For input data such as background ammonia data, the reference to IWAQM Phase 2 guidance is noted, but we believe that this guidance is very limited at best. The use of regional monitoring of background ammonia concentrations is recommended for site-specific recommendations for background ammonia. The FLMs should encourage the use of such monitoring data and should provide recommendations for how state monitoring programs should be conducted to provide site-specific data for use in CALPUFF modeling.

Cumulative Modeling Inventories

In terms of emission source inventories to be used for cumulative modeling, permit applicants are generally told that the FLMs do not have emission inventories for Class I areas, and that the burden is on the applicant to provide these inventories. After they are provided, the FLMs often critique the applicant for insufficiently researched data and lack of knowledge of the PSD minor source baseline dates for each Class I area. This is information that the FLMs should be required to provide, rather than challenging the applicant to provide.

In recent permitting efforts, the FLMs have advised permit applicants to screen out very small sources on a Q/D basis that would not materially affect the outcome of a cumulative modeling exercise. Since the majority of emission sources generally have low emissions of at least one pollutant, this screening exercise reduces the computing burden associated with CALPUFF modeling substantially. Specifically, the short-term emission rates (Q, expressed as tons per year, TPY) on a facility-wide basis that qualify for exclusion due to their low values are:

- SO_2 and NO_x emission rates less than 0.8D, where D is the distance in km of the source from the Class I area of concern, and

- PM_{10} emission rates less than 0.3D.

These formulas are selected so that at a distance of 50 km (the long-range transport threshold distance), the emission rates correspond to the PSD significant emission rates of 40 TPY for SO_2 and NO_x and 15 TPY for PM_{10}. Any facility with emissions of at least 100 TPY of a pollutant of interest would also be included in the inventory, no matter what the distance to the Class I area.

LEC recommends that FLAG 2008 provide these recommended screening levels for the emissions inventory in order to minimize the modeling effort required for any cumulative modeling analysis for PSD increment consumption and/or AQRV analyses in PSD Class I areas.

Modeling Assessments for Class I Areas Straddling or Within 50 km from a Proposed Source

EPA recommends CALPUFF for use in long-range transport (distances beyond 50 km), and AERMOD for distances up to 50 km. It is arguable as to whether a steady-state model such as AERMOD is appropriate for distances approaching 50 km. whereas CALPUFF has no inherent limitations as to its region of applicability. LEC recommends that for Class I areas that straddle a distance of 50 km or are close to 50 km from a proposed source, the applicant should be able to propose to use CALPUFF for predictions at all receptors without having to conduct a model evaluation study to get CALPUFF accepted for use. The requirement to conduct modeling using two different models (e.g., AERMOD and CALPUFF) for different receptors in the same Class I area or for adjacent Class I areas that straddle 50 km in distance would be overly burdensome and would lead to inconsistent results. Note that AERMOD does not have the same prediction capabilities for chemical transformation and some aspects of deposition modeling as does CALPUFF.

Visible Plume Analyses

For Class I area receptors within 50 km, FLAG 2000 discusses the need for a plume blight analysis. This analysis assumes that the plume is sufficiently close to the source that it is still relatively intact and it could be visible or cause a degradation of a scenic vista. In contrast, a regional haze approach that is consistent with long-range transport assumes that the plume is well mixed in the atmosphere and no longer perceived as a plume or layered haze. LEC recommends that for any analyses involving distances near 50 km for which CALPUFF is selected as the appropriate model, the visibility assessment should assume be based on regional haze rather than plume blight.

For plume blight analyses, LEC recommends the following changes or clarifications to FLAG 2008.

- The plume contrast threshold value of 0.05 and the color difference index threshold value (ΔE) of 2.0 should be used for Level 1, 2 and 3 analysis levels (i.e, including PLUVUE-II). FLAG 2000 and proposed FLAG 2008 inexplicably tighten the thresholds for refined analyses.
- The effect of the same emission increases assessed for long-range transport modeling (that is, only those associated with the proposed project, consistent with other PSD modeling analyses) should be used in the plume blight analyses. It is neither appropriate nor consistent with the rest of the modeling assessment to use existing (non-project) plus proposed emissions for the plume blight analysis. To determine a change in plume visibility due to the project, it is appropriate to model the plume blight impact difference from the pre- and post-project emissions and to take the difference in modeled impacts.
- For PLUVUE-II analyses, certain refinements that account for effects of the angle of the subtended plume are valid and may be applied as required. As noted by Zell et al. (2007) and Richards et al. (2007), the contrast perception and the color difference thresholds increase significantly as a function of the angle subtended by the plume (such that wider, more diffuse plumes are harder to see). The visibility impairment from a wide plume passing near the observer (which subtends a large angle) should be more correctly evaluated using PLUVUE-II by comparing the calculated contrast and color difference to thresholds that account for the angle subtended by the plume as described by the referenced papers.
- For VISCREEN (USEPA, 1992), applicants should be allowed and encouraged to use transport wind speed input data corresponding to and representative of the plume release height.
- For Class II area plume blight analyses requested by the FLMs, the modeling results should be reported for informational purposes only, since the FLAG thresholds are applicable only in mandatory Class I areas. In addition, the VISCREEN workbook background visual ranges should apply for Class II areas.

AQRV Analyses Required for Non-mandatory PSD Class I Areas

FLAG 2008 should clarify what AQRV analyses, if any, apply to non-mandatory Class I areas such as Indian reservations that have been re-designated as federal Class I areas since the 1977 Clean Air Act Amendments. For example, LEC understands that the federal visibility rule is only applicable to mandatory federal Class I Areas. FLAG 2008 should state that the analyses described in the document apply only to mandatory federal Class I areas. However, since non-mandatory federal Class I areas are often located in close proximity to mandatory areas, the protection provided to mandatory areas will protect nearby, non-mandatory areas as a secondary effect.

Emission Levels Used for Modeling Net Changes to Projects

Page 36 of the draft FLAG 2008 report indicates that

“Applicants should calculate the 24-hour average net emission increase for each pollutant from modified facilities as the maximum allowable 24-hour average minus the actual hourly rate averaged over the past two years (annual emissions over past two years/hours of operation over last two years).”

A footnote indicates that:

“Note that this is different from the emission change calculation used for short-term increment, which is calculated as the maximum allowable 24-hour average minus the highest occurrence over the past two years.”

LEC strongly disagrees with this intended policy of having different rules for modeling net emissions for increment consumption versus AQRVs. Not only is this requirement onerous in terms of the additional modeling that is required, it is contrary to the EPA guidance cited in the footnote and is basically unreasonable and unfair. We contend that the emissions used for increment analyses should also be used for AQRV analyses. If the final FLAG 2008 guidance does not remove this proposed requirement, permit applicants are justified to submit an alternative analysis that is consistent with EPA guidance.

Mitigation of Adverse Impacts

The FLAG document discusses the possibility of a project mitigating what is interpreted by the FLMs as an adverse impact from a review of the modeling analysis results. Refined analyses are always possible if the screening procedures do not clearly indicate that the project impacts are below screening thresholds. The nature of refined analyses could add significant time and resources to the permitting effort, however. Therefore, it is likely that an applicant would rather expedite the permitting process by providing a proposed emission reduction plan or a quantitative analysis that demonstrates that with emission reductions elsewhere combined with the proposed project impacts, the modeling results would show impacts below the screening levels. We recommend that the FLAG 2008 document reflect that mitigation proposals that would reduce the overall project's modeled impact to below screening threshold levels should be treated in the same fashion as if the original project impacts were modeled to levels below the screening thresholds.

Refinement of How Background Visibility is Defined

As the implementation of the Regional Haze Rule proceeds, many states and Regional Planning Organizations (RPOs) are considering refinements to the definition of natural background as tabulated by EPA (2003).

Changes in the definition of natural conditions for windblown dust and wildfires are encouraged by states, especially in the West, where the natural components of these visibility impairing emissions are underestimated. Many western states have found that after controlling anthropogenic sources of emissions (mostly SO_2 and NO_x), the remaining contributions to regional haze are difficult to mitigate because they are unpredictable and uncontrollable – basically because they are not man-made

For example, under truly natural conditions, the occurrence of wildfires is much more prevalent than has been represented in the EPA Regional Haze Rule and FLAG estimates of "natural conditions". For example, in the National Interagency Fire Center's description of wildland fire history at http://www.nifc.gov/preved/comm_guide/wildfire/fire_8.html, several items of interest are noted (text taken directly from this reference):

- Wildland fire should be interpreted as an ongoing organic event

- William Bartrum, noted naturalist, during his travels in Florida in the 1700s, reported fires burning somewhere every day. While Native Americans had fire firmly rooted in their way of life, post-Columbian immigrants in the new world sought a new order which did not embrace fire as a natural process. Suppression became the call.

- The creation of the U.S. Forest Service formalized a national approach to wildland protection, which was heavily weighted toward suppression. As other federal and state land resource management agencies came into being, they followed the U.S. Forest Service's lead. That lead advocated a national perspective of fire eradication and was underpinned by a lack of understanding of managing in concert with natural forces (e.g., predators, fires, floods). As a nation we sought to have "dominion over" the forces of nature.

A casual review of the causes of the worst 20% haze days at Class I areas in the western United States provides an indication that many are caused by wildland fires. As noted above, even more of these fires were likely in existence during a period before active human intervention (during "natural conditions"). EPA's 2003 document on "Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program" acknowledges that natural visibility conditions need to take wildland fires into account. We encourage states throughout the western US to re-evaluate the quantification of natural visibility conditions as affected by unrestricted wildland fires, and to submit refined estimates (possibly showing significantly higher natural visibility impairment). These re-evaluations of natural conditions should be completed well before the next milestone period of the Regional Haze Rule, and the revisions should be incorporated into FLAG guidance as they become available.

Another overlooked component of naturally-caused visibility impairment is airborne salt particles. Much of this comes from oceans or inland salty water bodies, but natural salt particle emissions can also be attributed to salt flats throughout the western United States.

Measurement and estimation techniques for naturally-occurring sodium chloride ("salt") concentrations continue to be a focus within the scientific community in general and stakeholders in the VISTAS region in particular. Sodium (Na+) and Chloride (Cl-) ions are generally accepted as the best markers for the presence of airborne salt particles. Difficulties in computing salt concentrations from data from the IMPROVE network arise because positive ions have historically not analyzed; therefore, sodium ion (the strongest indicator of salt) data are not readily available, except for a brief period between September 2002 and December 2004 during which time VISTAS measured Na+ at several southeastern Class I areas. Issues arise when using the chloride ion or elemental chlorine to estimate salt concentrations because reaction of gaseous nitric acid with salt produces sodium nitrate particles and the release of gaseous hydrochloric acid. The depletion of chlorine during this reaction results in an underestimation of salt when using chlorine as the marker.

Dr. Ivar Tombach (2006) has summarized a preferred hierarchy for estimating salt concentrations as envisioned by Pitchford (2006):

1. [Salt] = 3.27[$Na^{+}_{non\text{-}soil}$], where [$Na^{+}_{non\text{-}soil}$] = [Na+] – 0.57[Fe] and Na+ is collected on Nylon filters and analyzed using ion chromatography

2. [Salt] = 1.8[Cl-], where Cl- is collected on Nylon filters and analyzed using ion chromatography

3. [Salt] = 1.8[Cl], where Cl is analyzed by x-ray fluorescence (XRF) or proton induced x-ray emission (PIXE), despite a known bias toward underestimates due to loss of HCl on the filter media

4. [Salt] = 3.27[$Na_{non\text{-}soil}$], where [$Na_{non\text{-}soil}$] = [Na] – 0.57[Fe] and Na is analyzed by PIXE.

We therefore recommend that use of sodium rather than chloride ion measurements be used to determine the natural salt concentrations wherever possible.

Modeling studies using a global chemical transport model (GEOS-Chem; see Park et al., 2006) find that there is a substantial influence and variability in worst-case regional haze events due to wildland fires and transboundary pollution from Mexico and Canada. "Natural conditions" for states in the United States need to account for sources unregulated in other countries, especially for border states.

In summary, it is likely that as the implementation of the Regional Haze Rule proceeds, states will come to realize that the estimates of natural conditions are likely to be- too optimistic (low). One important element in this estimate is the re-evaluation by each state, especially in the West, of what natural conditions really mean in terms of the visibility conditions that would exist under natural conditions, accounting for wildland fires, natural salt, and transboundary pollution sources that are not regulated by the United States.

Determining Project Impacts on Ozone

FLAG (2000 and 2008) establishes a review process based on ambient measurement data and documented vegetative effects, such as oxidant stipple on sensitive vegetation to evaluate if a Class I area is sensitive to ozone and whether adverse conditions are present. In the absence of contrary evidence, FLAG considers ozone formation in all Class I areas to be NO_x limiting (VOC:NO_x ratio generally greater than 15:1). If the FLM has evidence that the area is VOC-limited (VOC:NO_x ratio less than about 4:1), which may be the case in portions of southern California, then the strategy would focus on VOC emissions. FLAG 2008 does not discuss cases (VOC:NO_x ambient ratios between 4:1 and 15:1) where ozone could be affected by changes in either or both VOC and NO_x emissions.

The flow chart provided in Figure O-1 of FLAG 2008 is an improvement over FLAG 2000 in that it provides a screening threshold of Q/D = 10 to determine if a PSD source needs to be evaluated for ozone impacts. While the availability of a screening technique will help to streamline the permitting process, there is no discussion of a justification as to why Q/D as formulated is a legitimate screening parameter for ozone. "Q" as proposed is the sum of three pollutants that relate to haze formation, SO_2, NO_x, and PM_{10}. For ozone formation (which is generally NO_x-limited), only NOx should be included in calculating Q.

The flow chart then instructs the FLM to determine whether ozone levels are an existing problem based on the observed effects on vegetation in their area, such as oxidant necrosis or growth loss in conjunction with ambient ozone measurements. In cases where ozone measurements are not readily available, the applicant may be asked to develop ozone exposure values. FLAG should clarify that this does not mean that an applicant would be asked to conduct ozone monitoring in or around Class I areas separate from the established PSD pre-construction monitoring requirements.

If the Q/D level is exceeded and current adverse ozone effects have been documented, the flow chart requires the FLM to conduct "Context/Refined Analyses" which are only very briefly discussed in the guidance. It is noteworthy that in areas of ozone NAAQS exceedances, new projects are required to offset NO_x emissions by a factor of more than 1:1. These offsets should usually be sufficient to constitute mitigation for ozone impacts from a newly proposed project. Otherwise, FLAG 2008 acknowledges that the "lack of an ozone source/receptor model make it difficult to protect…areas from the effects of new sources". There should be a more thorough and scientifically based discussion of the procedures to be used in the case of no offsets and a demonstrated situation of current ozone adverse effects, and whether the applicant can be allowed to conduct an independent ozone assessment in such a case.

Determining Project Impacts on Deposition

The FLAG 2008 report addresses wet and dry deposition of sulfur and nitrogen compounds emitted from PSD sources. The basis of FLM action, illustrated in Figure D-1 of the report, begins with an initial determination as to whether Q/D exceeds 10. "Q" is the sum of three pollutants that relate to haze formation, SO_2, NO_x, and PM_{10}. For deposition, PM_{10} (except for H_2SO_4) should be excluded from the calculation of "Q".

The flowchart then requires the comparison of estimated impact with impact thresholds established by the FLM. Most FLM areas will use the concept of Deposition Analysis Threshold (DAT). It is important to note that the DAT value assumes that cumulative deposition from emission sources may produce impacts upon Class I areas that are of concern. DATs are based 50% of natural background and a safety factor of 0.04 to account for 25 facilities of the same size affecting that Class I area. To use DATs for the determination of significant deposition, only the incremental impact of the proposed source, less creditable offsets, should be considered. The DAT should be clearly differentiated from the "Concern Threshold" which represents the levels of total sulfur and nitrogen deposition (including all natural and anthropogenic sources), above which additional loadings of substantial magnitude would be considered significant.

FLAG 2008 does not clearly differentiate between these concepts and it incorrectly requires existing facilities to double-count their impacts by adding total rather than incremental emissions to monitored background. To correctly differentiate between DATs and Concern thresholds and avoid double counting, the following tests should be implemented to evaluate future impacts.

Test 1) For cases where FLMs have established Concern Thresholds, they should be compared to Total Future Deposition, where:

Total Future Total Deposition = current deposition (based on monitoring)

+ modeled deposition of incremental emissions from the proposed source

+ modeled deposition from other permitted sources not yet operating

– modeled deposition associated with enforceable emission reductions not yet reflected in the monitoring data.

For current deposition, FLAG 2008 states that FLMs can either use the average or the maximum annual measured deposition data could be used. Given the substantial uncertainty in deposition measurements and substantial inter-annual variability, the average over several years is a more robust estimate of long-term deposition rates and should be used when multiple years of data are available.

Test 2) For cases where FLMs have adopted DAT values, then these should be compared to the Future Incremental Deposition, where:

Future Incremental Deposition = increase in emissions from proposed source + other permitted sources – enforceable emission reductions.

FLAG 2008 also indicates that the FLM may ask for monitoring or research in estimating current conditions for a Class I area. Given that this could be a costly and long-term undertaking, it should only be considered in cases where mitigation that is proposed still results in a deposition impact above the DAT.

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Appendix A

Review of Q/D and Results of Refined CALPUFF Analyses

ENSR has reviewed the modeling results for recently completed CALPUFF modeling analyses for PSD projects involving Class I area impacts. The projects included in this review are those for which the modeling analysis has been reviewed and accepted by the FLMs. The databases involve results from the following projects: Desert Rock (New Mexico), Toquop (Nevada), Greene County/Wellington (Pennsylvania), Wolverine (Michigan), and Victorville (California). The projects are all coal-fired power plants except for the Victorville project, which involves natural gas firing. Modeling results for the closest Class I areas were reviewed, while results for many of the more distant areas were not included because they would not add meaningful information to the analysis. A total of 11 Q/D data points were compiled from these projects, and are plotted in the figures provided below. Estimates of Q are based upon peak short-term emission rates where applicable.

Figure A-1 provides results for the most constraining significant impact level (SIL) short-term prediction for SO_2 among these refined CALPUFF analyses. The figure shows all cases with Q/D < 10 have insignificant impacts, whether the Q is based upon the sum of SO_2 + NO_x + PM_{10} or just SO_2.

Figure A-1 Results of Refined CALPUFF Predictions for SO_2 SIL

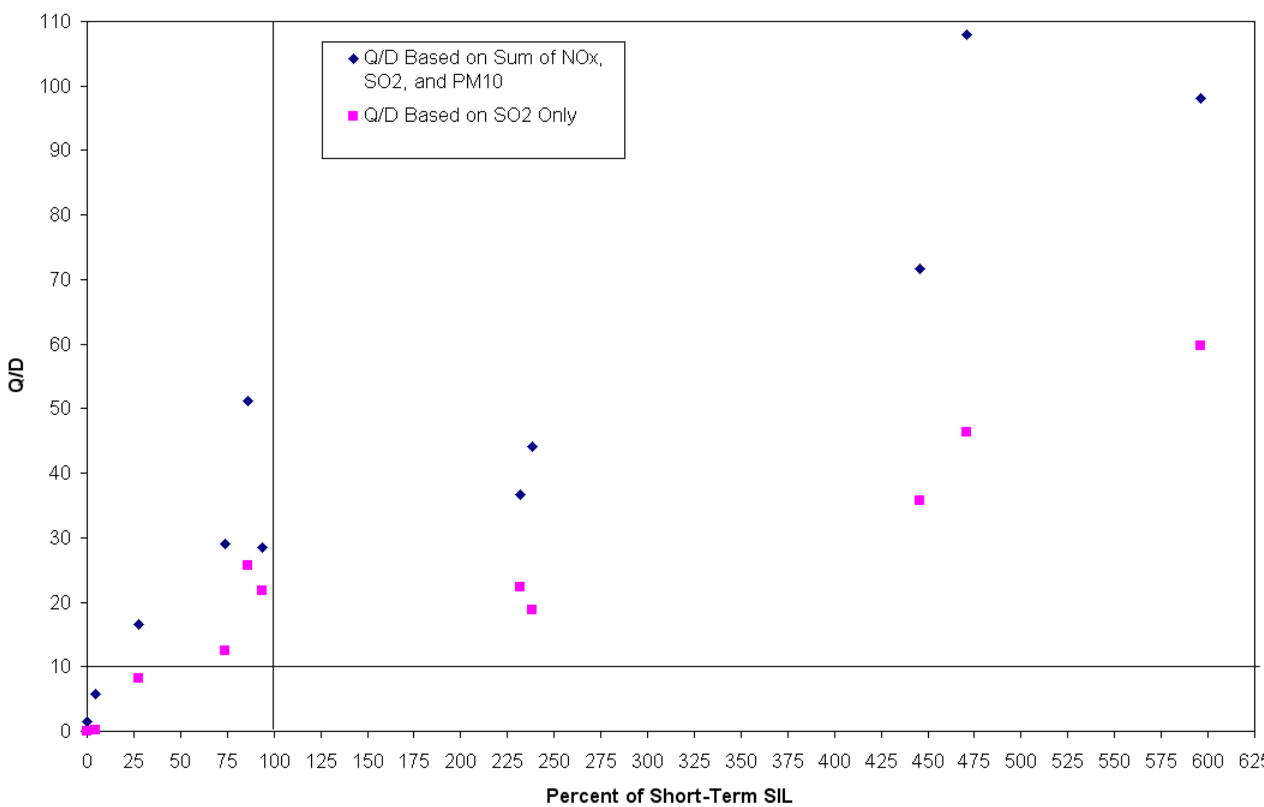

Figure A-2 and A-3 provide similar information for the NO_2 and PM_{10} SIL analysis for PSD increment consumption. The use of Q/D < 10 as a threshold for waiving the requirement for a PSD increment analysis works in all cases (for showing insignificant impacts), even if Q is limited to the specific pollutant of interest.

Figure A-4 provides a review of results for regional haze impacts. In this case, the Q/D < 10 screening criteria work with a large margin, since values of Q/D as high as 30 would still result in insignificant impacts.

Figures A-5 and A-6 show results for sulfur and nitrogen deposition, respectively. These results indicate that Q/D values as high as about 20 for just SO_2 or NO_x emissions would still show insignificant impacts.

Figure A-2 Results of Refined CALPUFF Predictions for NO_2 SIL

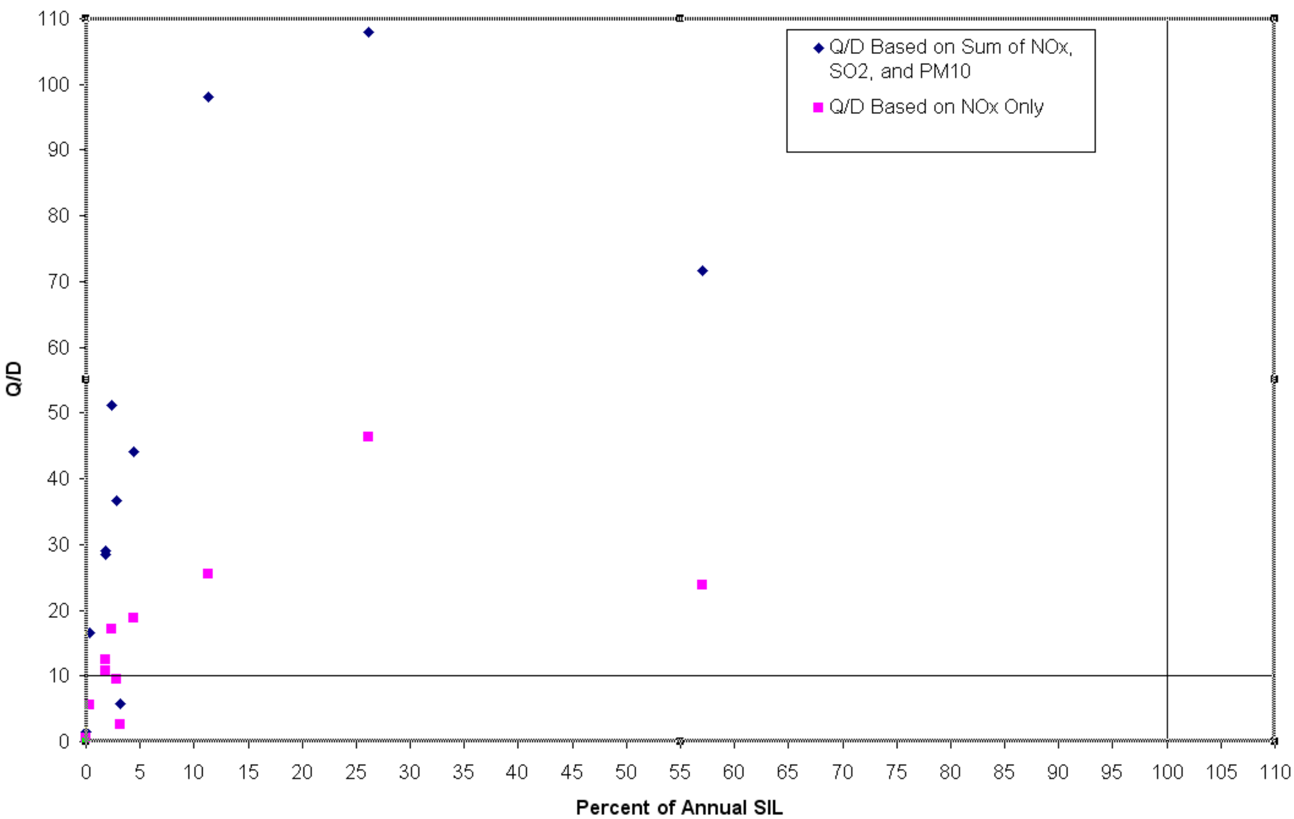

Figure A-3 Results of Refined CALPUFF Predictions for PM_{10} SIL

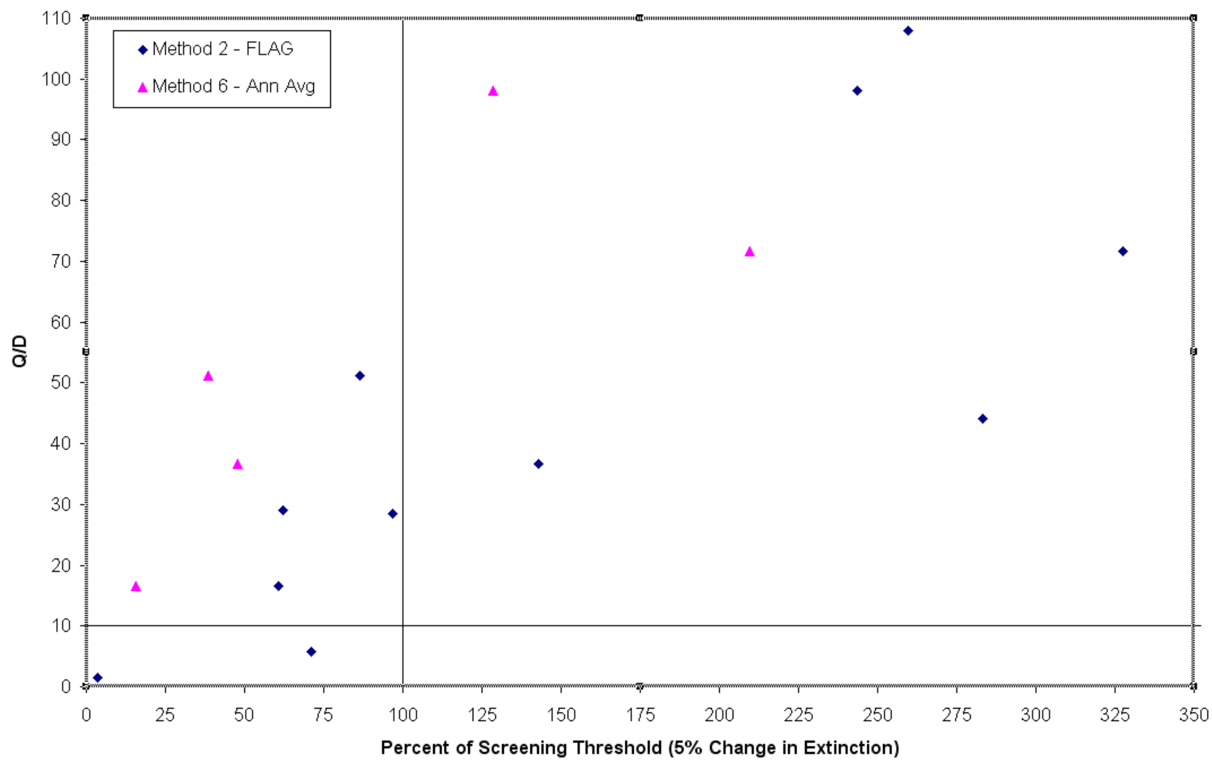

Figure A-4 Results of Refined CALPUFF Predictions for Regional Haze Impacts

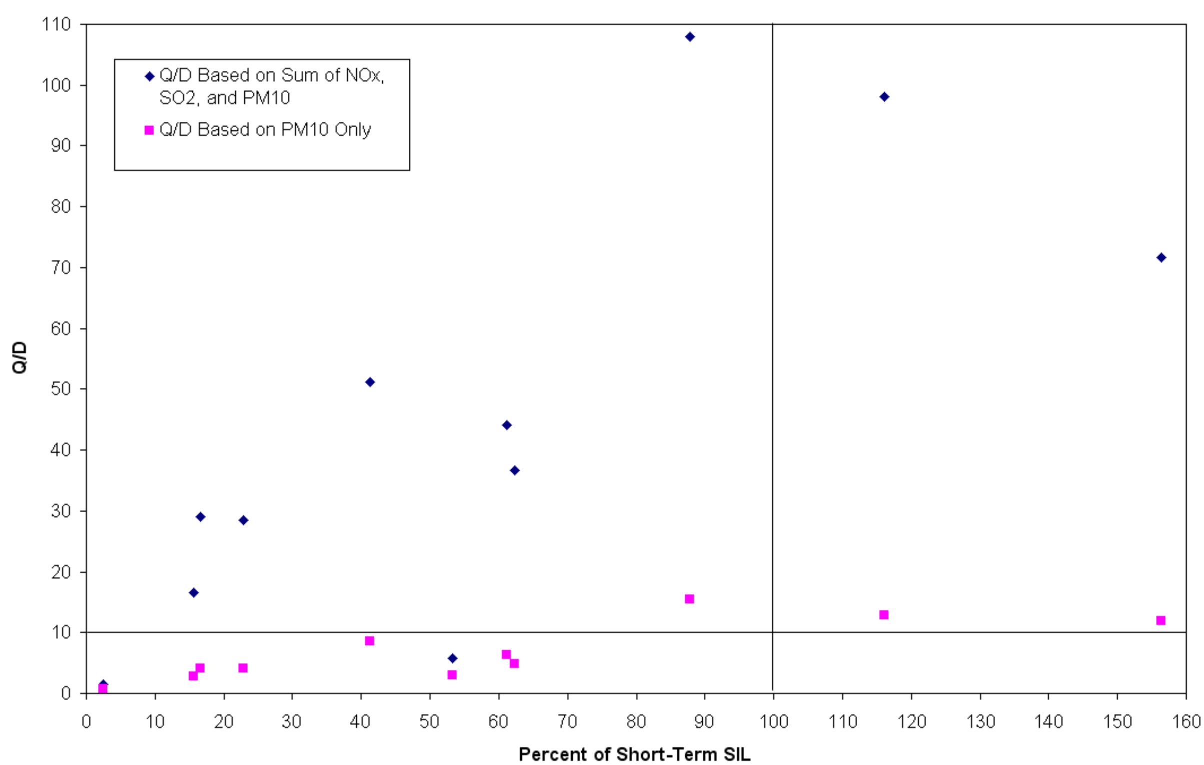

Figure A-5 Results of Refined CALPUFF Predictions for Sulfur Deposition

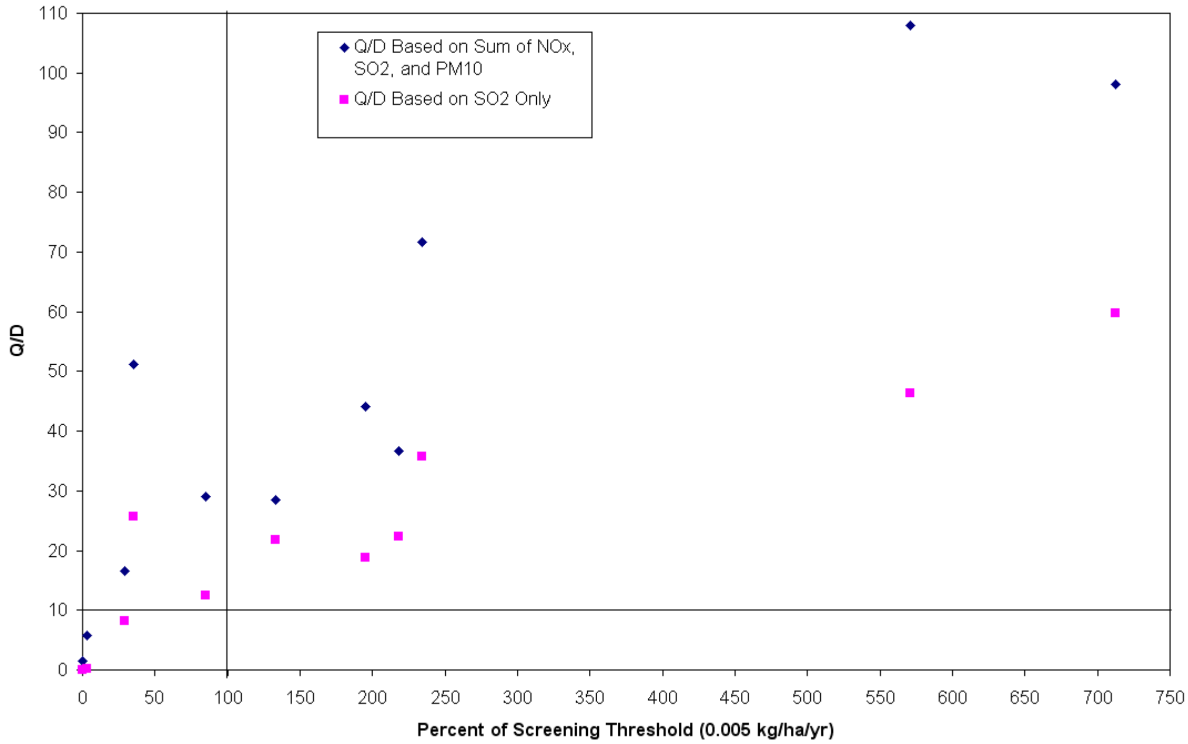

Figure A-6 Results of Refined CALPUFF Predictions for Nitrogen Deposition